

EXHIBIT A

OPENING EXPERT REPORT OF
PHILIP D. DREGGER
CONCERNING U.S. PATENT 6,357,193 B1

Diversi-Plast Products, Inc. v. Battens Plus, Inc.
United States District Court for the District of Utah
Civil Action No. 2:04-CV-01005 PGC

I. INTRODUCTION

A. Scope of Report

I have been asked by the attorneys for Battens Plus, Inc. ("Battens Plus") to prepare a report concerning U.S. Patent No. 6,357,193 B1 ("the '193 Patent"), a copy of which is attached as *Exhibit A*.

Specifically, but not exclusively, I have been asked to evaluate the invention disclosed in claim 2 of the '193 Patent. I have been informed by attorneys for Battens Plus that a company named Diversi-Plast Products, Inc. ("Diversi-Plast") is asserting that claim 2 of the '193 Patent is being infringed by a product sold by Battens Plus.

I reserve the right to supplement this Report to evaluate different claims of the '193 Patent should they be asserted by Diversi-Plast or entirely different claims should the United States Patent and Trademark Office grant Diversi-Plast any such claims in the currently pending Reissue / Reexamination proceeding.

B. General Background of the '193 Patent

The '193 Patent generally concerns a tile roof system including a roof batten used to secure roof tiles over a roof underlayment. The roof batten has passages that allow drainage and enables air exchange (i.e., ventilation). The drainage and ventilation promote evaporation and drying of water that may infiltrate into the tile roof system from time to time. In one embodiment, the batten includes at least one layer of a corrugated plastic material comprised of a pair of generally planar surfaces with a convoluted material extending between and cooperating with the planar materials to define a multiplicity of passages. According to the patent, the drainage and ventilation allowed by the '193 batten is an enhancement over the drainage and ventilation allowed by conventional wood batten systems and is a more cost effective means of providing enhanced drainage and ventilation promoting conditions than using a wooden cross batten system.

C. Qualifications and Publications Authored Within the Last Ten Years.

My curriculum vitae, detailing my qualifications and containing a complete list of the publications that I have authored within the preceding ten years, is attached as *Exhibit B*.

D. Other Cases in Which I Have Testified Within the Last Four Years.

Within the preceding four years, I testified in the following cases at trial or by deposition:

YEAR	CASE/COURT	SIDE RETAINED	CONSTRUCTION / ISSUE
2004	Allstate Insurance v Huillade Contra Costa County Superior Court	Plaintiff	asphalt shingles, gutters

2003	Sunnyvale Terraces v Green Valley Santa Clara County Superior Court	Defense	asphalt shingle roofs, gutters
2003	Malanado v IBM and Fluor Santa Clara County Superior Court	Defense	built-up roof, maintenance
2003	Washington Community School District v The Garland Company Iowa District Court, Keokuk County	Defense	modified bitumen roof, wind damage
2002	CA Ins. Com.v Golden Eagle Ins. San Francisco Superior Court	Defense	concrete tile, cost of repair
2002	Farm Hill Heights HOA v Davey Roofing, San Mateo Superior Court	Defense	built-up roof, drainage

E. Compensation

Fees for my services accrue at a rate of \$145 an hour except for services provided in the context of depositions, trials, preparation thereof, and services provided on weekends when fees for my services accrue at the rate of \$195 an hour.

F. Data or Other Information Considered

In preparing for this report I reviewed various documents that were provided to me and that I obtained. A list of documents provided to me by attorneys for Battens Plus is attached as *Exhibit C*. Documents I obtained are included as *Exhibit D*.

II. LEGAL STANDARDS

A. Claim Construction

In forming my opinion concerning the validity of the patent claims discussed in this report, I have been instructed to interpret the claims based on the content of the patent itself and as would one of ordinary skill in the art at the time the '193 Patent issued. Because the Court has not yet issued a claim construction order, I reserve the right to supplement my analysis in this Report to account for a claim construction different from that on which I have relied.

B. Invalidity

I have been informed by attorneys for Battens Plus that the first step in determining the validity of a patent claim is to properly construe the claim. I understand that as a general matter, a claim need not be limited to a preferred embodiment described in the patent specification or shown as a diagram in the patent.

i. Anticipation (35 USC § 102)

I have been informed by attorneys for Battens Plus that for a finding of invalidity of a patent claim under the relevant section of the patent statutes, each and every element of a claim, as properly construed, must be found either explicitly or inherently in a single, publicly

available, prior art reference or product, subject to the limitations imposed by the subsections of § 102.

It is my understanding that if such a single publicly available reference, patent or publicly available product discloses each and every element of a patent claim, then that claim is said to be "anticipated." In other words, it is my understanding that one can show anticipation of a claim only if each and every element as set forth in the claim is found in a single prior art reference. Moreover, I understand the elements disclosed in the prior art reference must be arranged as set out in the claim and the reference must describe the invention with the detail comparable to that contained in the claim. I also understand that the mere possibility that a figure in a prior art reference "might" be understood by one of skill in the art to disclose certain features is insufficient to establish that the prior art reference does disclose those features.

I have been informed that a claim is invalid under 35 U.S.C. § 102 (a) if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the invention sought to be patented. I understand that a claim is invalid under 35 U.S.C. § 102 (b) if the invention was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application for the invention sought to be patented. I also understand that a claim is invalid under 35 U.S.C. § 102 (e) if an invention described by that claim was described in a U.S. patent granted on an application for a patent by another that was filed in the U.S. before the date of invention for such a claim. It is also my understanding that a claim is invalid under 35 U.S.C. § 102 (g)(2) if, prior to the date of invention for the claim, the invention was made in the U.S. by another who had not abandoned, suppressed or concealed the invention.

ii. Obviousness (35 USC § 103)

I have been informed by attorneys for Battens Plus that a claim is invalid under 35 U.S.C. § 103 if, in view of a publicly available reference, patent, or combination of publicly available references and/or patents, the claim as a whole would have been "obvious" to one of ordinary skill in the art at the time the invention was made.

I have been informed that because an invention may be a combination of old elements, it is insufficient to merely identify each claimed element in the prior art. I understand that this would lead to the use of "hindsight" in determining validity of a patent. I understand that in order to prevent the use of "hindsight," there must be a "suggestion" or "motivation" in the publicly available reference or patent to combine the reference(s) and/or patent(s) to produce the claimed invention. It is my understanding that the references cannot be combined without either some explicit or implicit suggestion or motivation unless the suggestion or motivation could have come from one of ordinary skill in the art at the time the invention was made. However, I also understand that broad conclusory statements that one skilled in the art would combine prior art references to create the claimed invention is improper. Specific understandings or technological principles within the knowledge of one skilled in the art that would have suggested the combination must be shown.

As I understand it, "obviousness" is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and secondary considerations of obviousness, to the extent such considerations exist.

Secondary considerations bearing on obviousness may include, for example, a long felt but unmet need in the prior art that was satisfied by the invention of the patent; commercial success or lack of commercial success of subject matter covered by the patent; unexpected results achieved by the invention; praise of the invention by others skilled in the art; taking of licenses under the patent by others; deliberate copying of the invention; and contemporaneous and independent invention by others. I also understand that there must be a connection between any secondary considerations and the invention.

III. CLAIM CONSTRUCTION

Certain terms used in the '193 Patent have commonly understood meanings in the industry. Analysis of the '193 Patent is made quite difficult due to meanings apparently given to some terms that go beyond these commonly understood meanings and to meanings apparently give to some terms that remain unclear to a person of ordinary skill in the art¹ of tile roofing after reading them in the context of the '193 Patent specification. It is my understanding that the following terms have the following meanings and/or ambiguities:

- Overlayment - The claim term overlayment means any sheet material installed over roof framing or a roof deck for the purpose of moisture control or weather protection prior to installing an exterior roof covering system, which may or may not include roof battens. The term overlayment includes what is commonly referred to as a roof underlayment.
- Ply, Plies, Cross-Plies, First Plies, and Second Ply - The '193 specification uses the terms "ply," "plies," "cross-plies," "second ply," and "first plies". These terms are not defined. In my opinion a person with ordinary skill in the art of tile roofing [hereafter a person] would not be able to put together consistent workable definitions for these terms based on the context in which these terms are used in the '193 specification.
 - When used in the context of the tile roof industry, the term "ply" means one generally planar layer (ply) of at least two generally planar layers (plies) of a material that when adhered or placed together form a distinct unit. For example, in certain modestly sloped tile roofs, a "2-ply" underlayment membrane is installed below the tile. The term "ply" as applied to this example means 2 layers (plies) of an weather-resistant sheet material were installed flat over a roof deck and each other, in the same direction, and cemented together prior to installing an exterior roof covering.
 - Plywood often serves as the roof deck for tile roofs and on rare occasions,

¹ A person of ordinary skill in the relevant art in this case is a person with at least 3 years of experience with design, specification, or evaluation of tile roofs including battens.

plywood is cut in strips to serve as battens for roof tile. The term ply as applied to "5-ply" plywood means 5 layers (plies) of a wood veneer were laid flat over each other and glued together, forming one piece of plywood. The term "cross plies" when applied to plywood means that one or more plies in plywood (the cross plies), were still installed flat over one of the other layers but that the grain of that layer was oriented 90° (i.e., cross) to the direction of the grain in another layer.

- Claim 1 states the batten is comprised of "first and second plies" that "cooperate to define a multiplicity of passages." Within the context of how the term "ply" is used in the tile roof industry, I do not believe someone with ordinary skill would be able to understand how a batten comprised of first and second plies could cooperate to form passages. This is true because the plies, including cross plies, are expected to be generally planar, comprised of the same materials, and installed flat over each other. There is no provision for plies to cooperate to form passages in such a context.
- Claim 2 states the "second ply includes a multiplicity of cross plies extending between the first plies." Figure 5 depicts planar plies 52 and 54 and second ply 62. Second ply 62 is described in the specifications (page 3, lines 19-23) as including a "multiplicity of cross-plies" and that the "cross-plies extend generally perpendicular (or otherwise transversely) between planar plies 52 and 54." Within the context of the tile roof industry, I do not believe a person with ordinary skill would be able to understand how a singular ply of material, a "second ply", could be made up of a multiplicity of generally perpendicular cross plies apparently held together only by air. This is true because a ply is considered to be comprised of a contiguous layer of material. In addition, a person would not be able to understand how any construction could have more than one "first" ply. This is true because only one layer can be the "first". The same material can comprise the 3rd or 5th plies, but only one can comprise the "first" ply. Apparently, the term "first ply" has a separate meaning. Finally, apparently the term "second ply" has two meanings. One as described above related to Figure 5 and a separate meaning as applied to Figure 4 where the second ply is continuous and convoluted.

Accordingly, definitions for the terms ply, plies, cross plies, first ply, and second ply; as used in the '193 patent must go beyond understandings common to a person with ordinary skill in the art of tile roofing. Nevertheless, to continue my analysis, it is my understanding the term "ply", based on the '193 specification and figures, apparently means a layer of material generally planar or convoluted and discreet or continuous. The term "first plies" apparently means any material with a planar surface, as depicted as elements 52 and 54 in, for example, Figure 4. The term "second ply" apparently has two meanings. As depicted in Figures 4 and 5, "second ply" apparently means a material that is either convoluted or straight and either continuous or discreet; and that extends between and cooperates with two

generally planar surfaces to form passages. The term "cross plies" apparently means a material within the meaning of the term "second ply" that is discreet and extends generally perpendicular or otherwise transversely between two generally planar surfaces.

IV. VALIDITY ANALYSIS OF CLAIM 2 OF THE '193 PATENT

I have been informed by attorneys for Battens Plus that claim 2 of the '193 Patent is a dependant claim that depends from claim 1. I am further informed that as a dependant claim, claim 2 is interpreted to include all the limitations of claim 1.

1. The text of claim 1 is as follows:

A tile roof system, comprising:

- [1] An overlayment;
- [2] A tile; and
- [3] A batten disposable between the tile and the overlayment, the batten comprising: at least one layer comprising a generally planar first ply and a second ply, the first and second plies cooperating to define a multiplicity of passages extending generally transversely to a longitudinal axis of the batten.

2. The text of claim 2 is as follows:

The batten of claim 1, in which the second ply includes a multiplicity of cross plies extending between the first plies.

A. Anticipation

It is my opinion that claim 2 of the '193 Patent is anticipated by prior art.

i. **UK Patent GB 2 062 056 "Roofing Laths and Roofs Incorporating Such Laths", published May 20, 1981 (Neumann)]**

The Neumann Patent generally concerns a roof lath (i.e., batten) used to secure roof tiles or similar exterior roof coverings over a roof underlayment while allowing ventilation and drainage of water that may infiltrate into the roof system from time to time. In one embodiment, the lath includes transverse apertures through it at intervals. In another embodiment, this first embodiment is fitted with a base plate. In the combined embodiment, the base plate and the lath cooperate to define a multiplicity of transverse apertures. The apertures allow roof ventilation and allow water to drain away. According to the patent, the Neumann lath is a more cost effective means of providing ventilation and drainage below roof tiles than using "espalier lathing" (i.e., cross battens).

'193 Claim1 in light of Neumann

- "A tile roof system, comprising..." – The Neumann patent title states that it applies to "Roofing laths and roofs incorporating such laths". Neumann page 1 line states "this invention relates to roofing laths for hanging roof tiles or shingles. See also Neumann

claim 7. The Neumann title and description disclose the '193 claim element "a tile roof system".

- *"an overlayment;"* – Neumann specifications page 1, 6-9 states "In one of the types of roof cladding common today, covering boards are first nailed onto rafter, and over this boarding sheets of waterproof roofing paper, or felt, or plastics sheeting are laid." The Neumann description "sheet of waterproof roofing paper, or felt, etc." discloses the '193 claim element "an overlayment". See also Neumann specification page 1, lines 115-117 and Neumann claim 7.
- *"A tile; and"* – Neumann specifications page 1, lines 4-5 states "This invention relates to roofing laths for hanging roof tiles or shingles". See also Neumann claim 7. The Neumann "roof tiles" discloses the '193 claim element "a tile roof system".
- *"A batten"* – Neumann figures 1 through 8 show lath of different shapes. Neumann specifications page 1, lines 82-84 state "the roof lath itself can have any desired form which permits the roofing tiles to be hung safely in accordance with the usual rules." See also Neumann specifications page 1, lines 4-14 and Neumann claim 7. The illustrations and descriptions of the use of the Neumann lath disclose the '193 claim element "a batten".
- *"Disposable between the tile and the overlayment,"* – Neumann specification page 1, lines 4-14, describes consecutively installed components: "sheets of waterproof roofing paper or felt", which is "sometimes followed by espalier lathing," which is followed by "horizontal roof lathing, on which the roofing tiles or shingles are then hung." Neumann specifications page 1, lines 52-54 states "The object of the present invention is to provide a roof lath which makes it possible to dispense with the espalier lathing...". The Neumann lath is described as positioned between the tile and the overlayment and discloses the '193 claim element "disposable between the tile and the overlayment".
- *"The batten comprising: at least one layer"* – Each of the battens of Neumann Figures 1 through 8 comprise at least one layer that thereby disclose the '193 claim element "the batten comprising at least one layer".
- *"Comprising a generally planar first ply"* – Each of the battens of Neumann Figures 1 through 8 comprise at least one surface comprising a generally planar first ply. Neumann Figure 6 depicts a batten with a separate base plate comprising a generally planar first ply.
- *"And a second ply,"* – The battens depicted in Neumann Figures 1, 2, 6, and 7 comprise a second ply that extends between at least two generally planar material surfaces. The description on page 2, lines 56-63 notes that "may be of any suitable material, for example wood or plastics. The apertures 1 can be either milled out from the lath, or the lathe can be formed by short strips fixed transversely to the longitudinal direction at intervals with gaps between them, to a continuous lath." These strips of material comprise a second ply, in the form of a series of cross plies.

- *"The first and second plies cooperating to define a multiplicity of passages"* – The apertures 1 of figures 1, 2, 6, 7 depict passages defined by cooperation of the first and second plies.
- *"Extending generally transversely to a longitudinal axis of the batten."* – The apertures 1 of figures 1, 2, 6, 7 depict passages extending generally transversely to the longitudinal axis of the batten.

'193 Claim 2 in light of Neumann

- *"The batten of claim 1"* – See comments about in claim 1.
- *"In which the second ply"* – See comments above in claim 1 regarding a "second ply".
- *"Includes a multiplicity of cross plies extending between the first plies"* - The battens depicted in Neumann Figures 1 and 6; comprise a multiplicity of cross plies extending between first plies. The description on page 2, lines 56-63 notes that "the roofing lath may be of any suitable material, for example wood or plastics. The apertures 1 can be either milled out from the lath, or the lath can be formed by short strips fixed transversely to the longitudinal direction at intervals with gaps between them, to a continuous lath." These short strips of material comprise a second ply, in the form of a series of cross plies. A series of cross plies comprises a multiplicity of cross plies. Figure 1 depicts a multiplicity of cross plies extending between the lower generally planar surface of the batten (a first ply) and the upper generally planar surface of the batten (another first ply). The cross plies are oriented both along the longitudinal axis of the batten and transverse to it. The description of Figure 6 provides that the base plate may also be used with a lath according to either Figure 1 or Figure 2 (See page 2, lines 87-89). In the embodiment in which the lath of Figure 1 is fitted to a base plate, the cross pies would extend between the generally planar base plate (a first ply) and the generally planar upper surface of the batten (another first ply).

Based on the foregoing it is my opinion that claim 2 of the '193 Patent is anticipated by Neumann.

B. Obviousness

It is my opinion that claim 2 of the '193 Patent is rendered obvious in light of certain prior art.

i. In view of "Cor-A-Vent" products taken with Neumann.

The Neumann Patent (see above) concerns a roof tile system including roof lath (i.e., battens) used to secure roof tiles or similar exterior roof coverings over a roof overlayment. The roof lath has openings that promote ventilation and drainage of water that may infiltrate into the roof system from time to time. In one embodiment, the lath includes transverse apertures through it at intervals. In another embodiment, this first embodiment is fitted with a base plate. In the combined embodiment, the base plate and the lath cooperate to define a multiplicity of

transverse apertures. The apertures allow roof ventilation and allow water to drain away. According to the patent, the Neumann lath is a more cost effective means of providing ventilation and drainage below roof tiles than using "espalier lathing" (i.e., cross battens).

Cor-A-Vent, Inc. produces ridge and strip vent products as components of roof systems, including tile roofs, to promote ventilation. Cor-A-Vent ridge and strip vent products are well known within the tile roofing industry and Cor-A-Vent literature has been publicly available since at least 1991. The Cor-A-Vent ridge vent product is virtually identical in construction and utility to the roof ventilator product described Patent 5,304,095 (Morris '095). The Cor-A-Vent strip vent product is virtually identical in construction to the Morris '193 roof batten but is not necessarily promoted for use as a roof batten. Cor-A-Vent 1995 drawings (see exhibit D) indicate the strip vent construction is virtually identical to the roof batten constructions depicted in '193 Figures 3, 4, and 9.

As discussed above, the Neumann roof batten anticipates the roof batten of '193 Claim 2. Alternately, combining the Cor-A-Vent strip vent with the ventilating roof batten of Neumann makes the roof batten of '193 obvious.

Claims 1 and 2 of '193 Patent

All elements of Claims 1 and 2 are found explicitly or inherently in Cor-A-Vent literature dating prior to 1998 (see Exhibit D), except for promoting the use of Cor-A-Vent vents as a roof battens.

- Cor-A-Vent 1989 - Figure 7 depicts a roof tile system, a tile, and a batten.
- Cor-A-Vent 1989, Page 4, lines 6 and 7 of the paragraph titled "preparing for the installation" describes an asphalt "dry sheet". An asphalt "dry sheet" is another name for an overlayment.
- Cor-A-Vent 1989 - All figures of strip vents are shaped like roof battens and indicate they are comprised of at least one layer comprising a generally planar first ply and a second ply.
- Cor-A-Vent 1992 Tile and Cor-A-Vent 1995 - The drawings and figures depict vents shaped like roof battens with the first and second plies cooperating to define a multiplicity of passages extending generally transversely to a longitudinal axis of the vent product.
- Cor-A-Vent 1992 Tile and Cor-A-Vent 1995 - The drawings and figures depict vents shaped like roof battens, in which the second ply includes a multiplicity of cross plies extending between the first plies.

Neumann explicitly discloses roof battens used to secure roof tiles over a roof underlayment with passages allowing ventilation and drainage of water that may infiltrate into the roof system from time.

In my opinion that a person having ordinary skill in the art of tile roofing at the time of the '193 invention would have been motivated to combine the Cor-A-Vent strip vent product with the Neumann venting and draining batten to achieve the venting and draining batten invention of claim 2 of the '193 patent because of suggestions in the Cor-A-Vent literature and the Neumann patent, because of technical principles in the art of tile roofing, and for economic advantage.

Similar Suggestions - A person having ordinary skill in the art of tile roofing at the time of the '193 invention would have been motivated to combine the Cor-A-Vent strip vent product with the Neumann venting and draining batten due to strikingly similar suggestions contained in the descriptions of each element.

- Both suggest elements intended for use in tile roofs. For example, see figures and descriptions in Cor-A-Vent 1990 and see Neumann abstract and specifications.
- Both suggest elements serving to space roof components apart. For example, see Cor-A-Vent 1989 Figure 7, Cor-A-Vent 1990 Figure 5, and see Neumann abstract and specifications.
- Both suggest elements for promoting tile roof ventilation. For example, see figures and descriptions in Cor-A-Vent 1990, especially Figures 5 and 7, and see Neumann abstract and specifications.
- Both suggest a ventilation promoting element that is of a similar long rectangular shape. See figures and descriptions of Cor-A-Vent Strip Vent in Cor-A-Vent 1989, page 2; in Cor-A-Vent 1992 Strip, and see Neumann Figures 1 and 2.
- Both describe ventilation in terms of the sum of the cross-sectional area of openings provided in the ventilation promoting element. For one example of many, see "features" and "specifications" in Cor-A-Vent 1989, page 2. Also see Neumann, page 1, lines 76-81.

Inherent Suggestion and Technical Principle - A person having ordinary skill in the art of tile roofing at the time of the '193 invention [hereafter a person] would have been motivated to combine the Cor-A-Vent strip vent product with the Neumann venting and draining batten due to a suggestion inherent to Neumann that suggests Cor-A-Vent products.

- Neumann claims ventilation in the space between an overlayment and roof tile through transverse apertures in the Neumann battens. Ventilation requires a pathway of continuous openings from the roof eave to the roof ridge to allow air to flow in, through, and out of the ventilated space. The use of Neumann battens alone may not be sufficient to provide an adequate amount of continuous pathway to allow ventilation on many tile roofs. On many tile roofs, the ridge tile and/or weather blocks (e.g., flexible flashings, mortar, etc. below ridge tile and covering the top edge of the uppermost course of tile) obstruct the exit of air from the space intended for venting. In such cases, an additional element may be needed to supplement exit of air near ridges, and thereby is inherently suggested in Neumann.

- The Cor-A-Vent ridge vent product is promoted specifically to provide a means for air to exit roof tile systems near ridges as part of roof ventilation while maintaining weather protection. While the space promoted to be vented by the Cor-A-Vent ridge vent product is below not above the roof deck, the means of air exit provided by the Cor-A-Vent ridge vent product could also serve to allow air to exit from a space above the roof deck just the same. See Cor-A-Vent 1989, Figure 7 and Cor-A-Vent 1990 Figures 2, 3, 5, and 7. In my opinion, a person would consider the Cor-A-Vent ridge vent product to meet the inherent suggestion for venting near roof ridges in Neumann.
- The Cor-A-Vent ridge vent product discussed so far is not necessarily the element to be combined with the Neumann batten. The Cor-A-Vent strip vent which is portrayed along side the ridge vent product in many pieces of Cor-A-Vent literature is the element to be combined with the Neumann batten.
- In my opinion, a person having ordinary skill in the art of tile roofing at the time of the '193 invention would have been motivated to combine the Cor-A-Vent strip vent product with the venting and draining Neumann batten, if not already motivated to do so by the many similar suggestions discussed above, in light of the suggestion inherent in Neumann which suggests the Cor-A-Vent ridge vent product.

Understandings and Technical Principles - A person having ordinary skill in the art of tile roofing at the time of the '193 invention [hereafter a person] would have been motivated to combine the Cor-A-Vent strip vent product with the Neumann venting and draining batten to the achieve the venting and draining batten invention of claim 2 of the '193 patent because of technical principles in the art of tile roofing and for economic advantage.

- A technical principle of ventilation indicates that the effectiveness of ventilation is improved by increasing the relative percentage of openings to the cross-sectional area of the space to be vented. Apertures in of the Neumann batten, although many, constitute a limited percentage of the cross-sectional area of the batten surface and are positioned primarily on the lower half of the batten. The Cor-A-Vent strip vent product, by the nature of its construction, has a relatively higher percentage of cross-sectional openings. A person would be motivated to combine the Cor-A-Vent strip vent with the Neumann batten to increase the effectiveness of ventilation.
- In areas with objectionable insect populations and for home owners with particular sensitivities to insects, the art of tile roofing includes the understanding that opportunities for insects to move and nest within a tile roof system should be limited when practical. The apertures of the Neumann roof batten would allow the movement and nesting of some types of insects within a roof tile system. The passages of the Cor-A-Vent strip vent are smaller and serve to further reduce the types of insects that could more around and nest within a tile roof if used as the roof battens instead of Neumann. A person would be motivated to combine the Cor-A-Vent strip vent with the Neumann batten to reduce insect nesting opportunities in accordance with the principle stated above.

- As with all forms of construction, the principle of finding and using products that allow tile roofs to be installed more quickly applies. Some embodiments of the Neumann roof batten require nail holes. Aligning performed fastener holes in roof tile with pre-formed holes in roof battens would be labor intensive. In other embodiments of the Neumann batten, it is not clear if the batten would allow nailing of roof tile without pre-drilling the batten, a time consuming process. The Cor-A-Vent strip vent product is readily nailable without pre-drilling. A person would be motivated to combine the Cor-A-Vent strip vent with the Neumann batten to reduce labor costs associated with batten and tile installation in accordance with the principle stated above.
- As with all forms of construction, the principle of finding and using products that are readily available applies. I am not aware of an embodiment of the Neumann tile roof batten commercially available in the United States. Cor-A-Vent strip vent products have been readily available throughout the United States since before 1998. A person would be motivated to combine the Cor-A-Vent strip vent with the Neumann batten as part of seeking a readily available product to use as a draining and venting roof batten in accordance with the principle stated above.

Other Combinations – At least one of reasons discussed for the combining the Cor-A-Vent strip vent with the Neumann roof batten, would also apply as motivation for a person having ordinary skill in the art of tile roofing at the time of the '193 invention to combine the Cor-A-Vent strip vent product with the Vasquez grooved roof batten (Patent 5,471,807, Vasquez); or to combine the roof Morris '095 roof ventilator product with the either the Neumann or Vasquez venting and/or draining batten; to achieve the venting and draining batten invention of claim 2 of the '193 patent.

Dated: January 17, 2006



Philip D. Dregger, PE

Exhibit A



US006357193B1

(12) **United States Patent**
Morris

(10) Patent No.: **US 6,357,193 B1**
(45) Date of Patent: **Mar. 19, 2002**

(54) **ROOF BATTEN**

(75) Inventor: **Richard J. Morris, Prior Lake, MN (US)**

(73) Assignee: **Diversi-Plast Products, Inc., Golden Valley, MI (US)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/465,099**

(22) Filed: **Dec. 16, 1999**

Related U.S. Application Data

(60) Provisional application No. 60/112,597, filed on Dec. 17, 1998.

(51) Int. Cl. 7 **E04B 7/00; E04D 1/00**

(52) U.S. Cl. **52/553; 52/198; 52/199**

(58) Field of Search **52/198, 199, 553**

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(57) **ABSTRACT**

A roof batten for use in spacing tiles or similar exterior roofing members from a roof overlayment is provided. In one embodiment, the batten includes at least one layer of a corrugated plastic material with a pair of generally planar plies and a convoluted ply cooperating with the planar plies to define a multiplicity of passages. The passages allow drainage of water infiltrating the tiles and further promote drying.

22 Claims, 4 Drawing Sheets

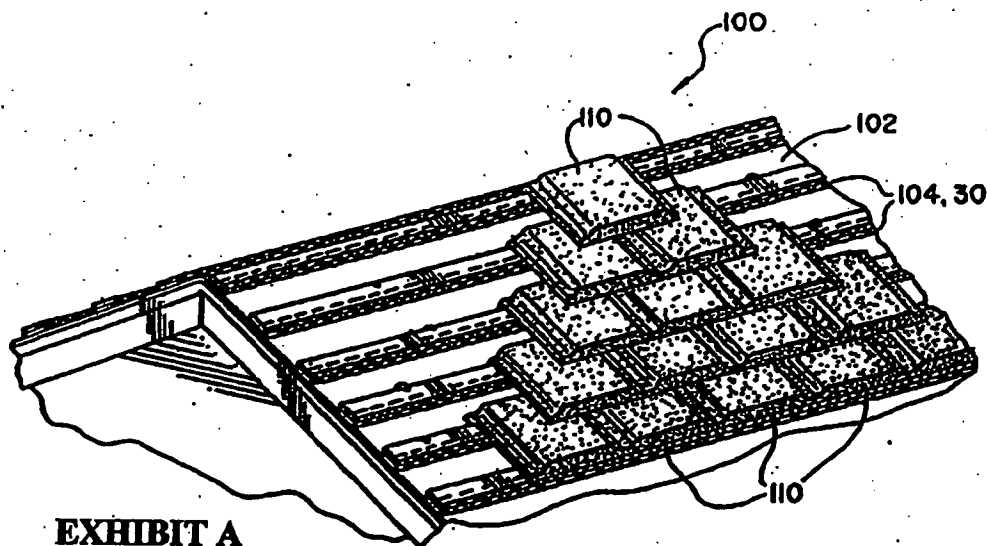


EXHIBIT A

EXHIBIT

A

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Fig. 1
PRIOR ART

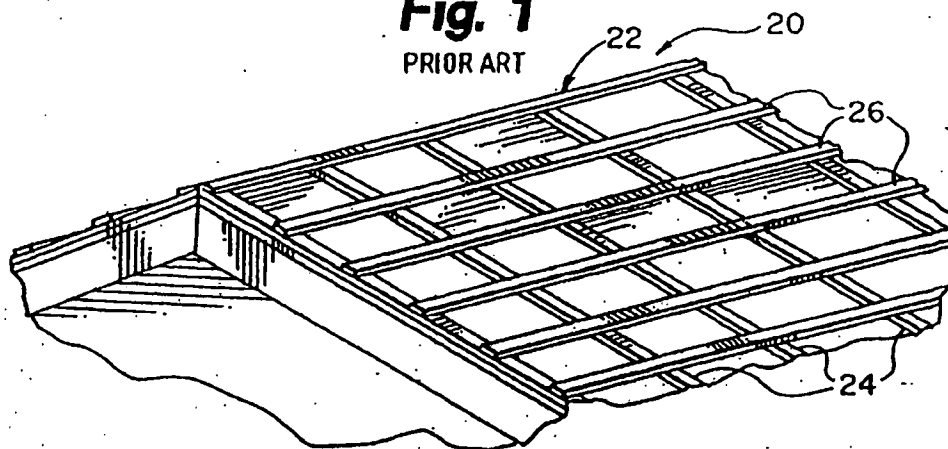
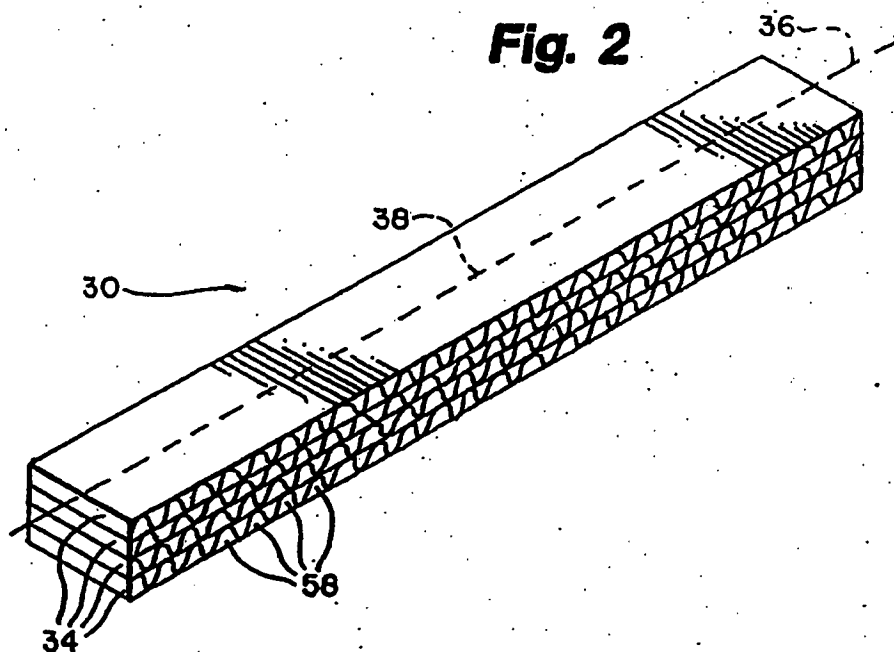


Fig. 2



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Fig. 3



Fig. 4

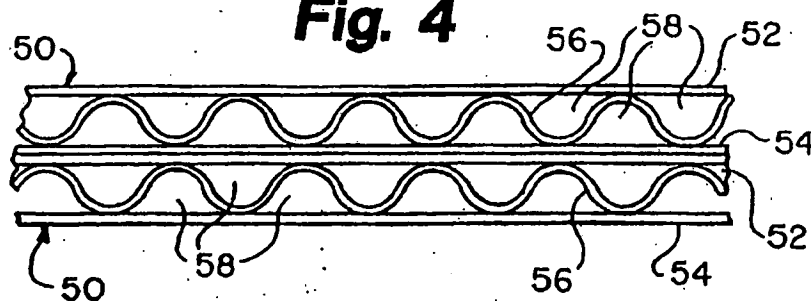


Fig. 5

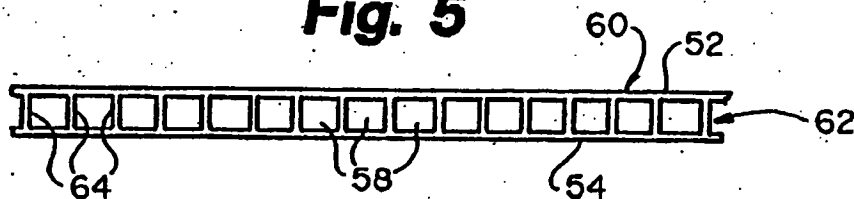
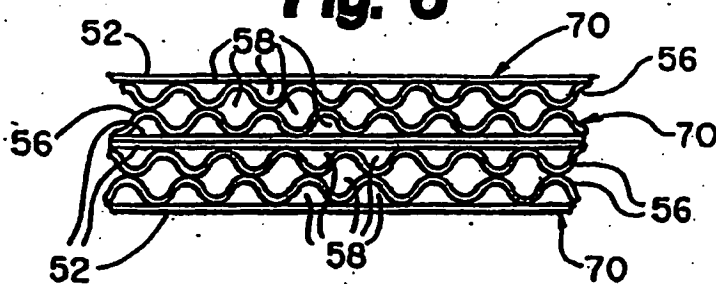


Fig. 6



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Fig. 7

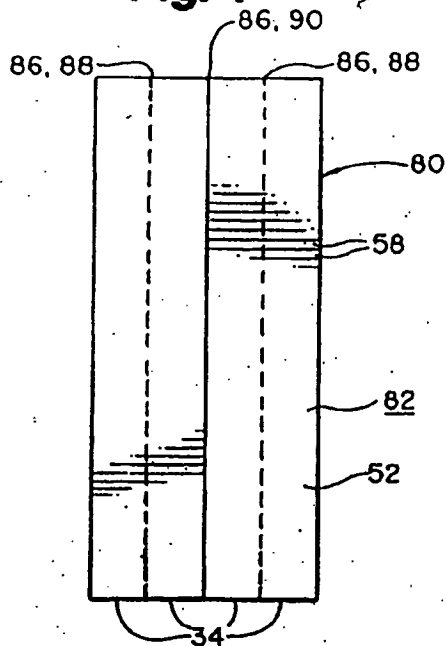


Fig. 8

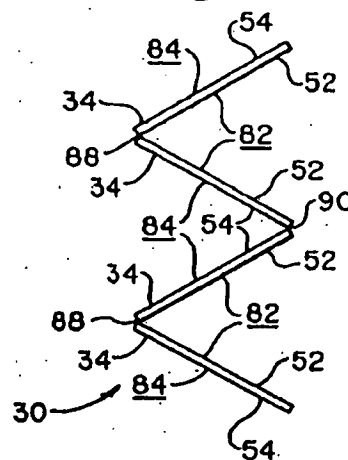
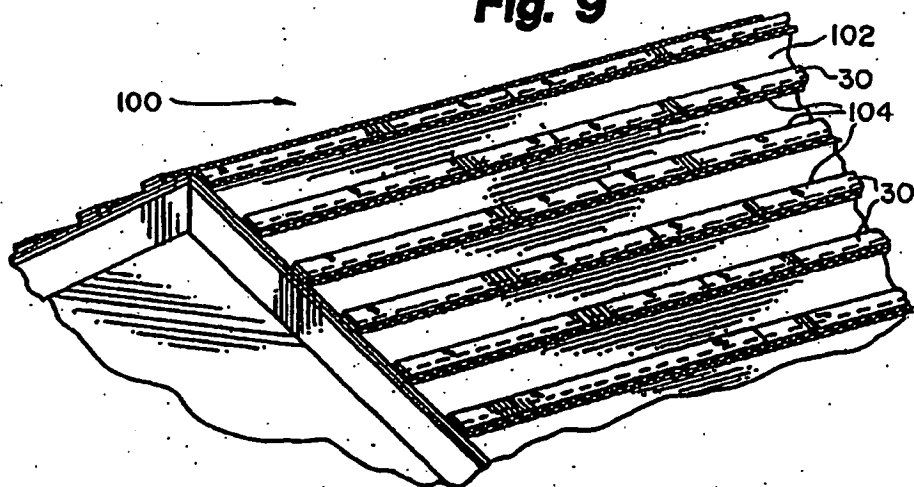


Fig. 9

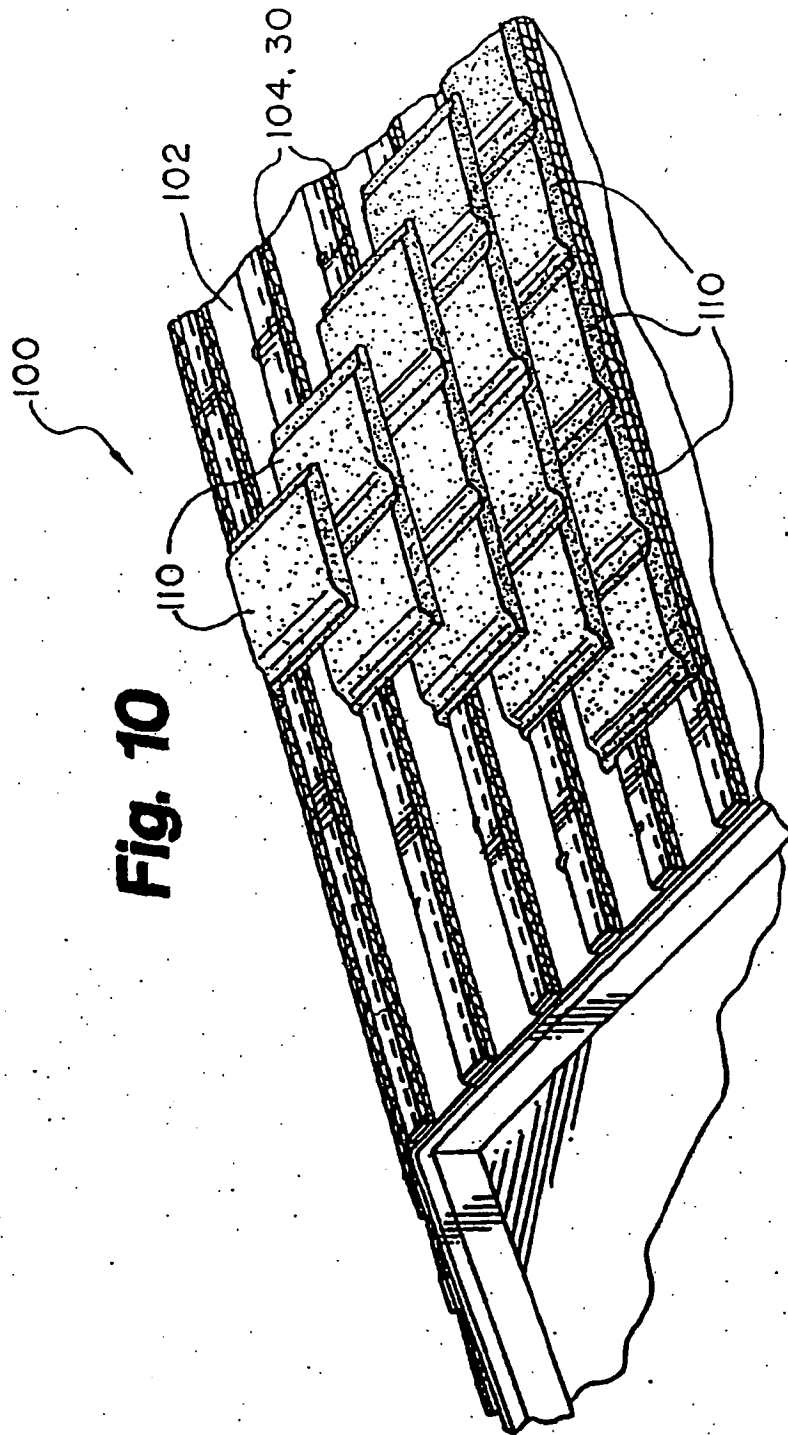


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ROOF BATTEN

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) to, and hereby incorporates by reference, U.S. Provisional Application No. 60/112,597, filed Dec. 17, 1998.

FIELD OF THE INVENTION

This invention relates to roof coverings and, in particular, this invention relates to building materials or devices which extend the lives of tile roofs by preventing water infiltration.

BACKGROUND OF THE INVENTION

Most tile roofs include an exterior decking or sheathing, which overlays a structural framework of either trusses or rafters. Typically, decking includes plywood sheets or other planking members. One or more layers of overlayment, such as felt (tar) paper, is usually attached to the decking. Battens are normally placed over the felt paper before tiles are installed. The battens are usually fixed to the roof by fasteners, such as nails or staples, driven through the battens and felt paper and into the roof decking. Battens are typically wood strips and serve to separate the tiles from the overlayment. Separation between tiles and overlayment is necessary to ensure that water infiltrating the tiles onto the felt paper evaporates quickly. If water is otherwise allowed to stand or pool, the water may infiltrate through the felt paper and penetrate the roof decking, thereby potentially causing deterioration of the roof decking and the underlying framework. When horizontal baiting is installed, water which has infiltrated the roof tiles tends to pool on the upper-slope sides of the battens, thereby potentially causing roof deterioration.

Means previously used to avert or diminish the likelihood of deterioration to tile roofs due to water pooling and infiltration include leaving gaps between adjacent battens and cutting drainage channels on the undersides of the battens. These means have been largely ineffective and have often added to the expense and time necessary for tile roof installation as well.

As depicted in FIG. 1, roof 20 has installed thereon counter batten system 22 of the prior art. Counter batten system 22 includes vertical battens 24 overlaid with horizontal riser strips 26. Typically, vertical battens 24 are $\frac{3}{4}$ by $1\frac{1}{2}$ inch wooden boards, often four feet in length. Vertical battens 24 are typically installed every 16 inches, on center. Horizontal riser strips 26 are typically wooden lathes and are installed atop vertical battens 24 at spacings determined by the dimensions of the tiles to be installed. While counter batten system 22 is somewhat effective in eliminating pooled water, the expense and time required to install counter batten system 22 is often prohibitive.

There is then a need for a device or roofing material which spaces tiles from underlaying roofing and structural members, which greatly reduces or eliminates water pooling when water infiltrates the roof tile system, and which may be installed quickly and efficiently.

SUMMARY OF THE INVENTION

This invention substantially meets the aforementioned needs. There is provided a spacer operatively disposable between a roof decking and an exterior roofing material. The spacer may include at least one layer of a material, the material defining a multiplicity of passages therethrough.

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The passages defined may extend generally transversely to a longitudinal axis of the spacer and may allow infiltrated liquids to drain therethrough, thereby preventing accumulation of the infiltrated liquids. The spacer may further include a generally planar first ply and a convoluted second ply cooperating to define the multiplicity of passages. A plurality of first plies and a generally convoluted second ply may be present. The second ply may include a multiplicity of cross-ply extending between the first plies. The spacer may include a plurality of layers. Each adjacent layer of the spacer may be hingably connected. The layers, when assembled in a stacked relationship, may be fastened together by stitching, staples, glue, hot air welding, ultrasonic welding, infrared bonding, other methods known to the art, or any combination thereof.

There is also provided a tile roof system, the tile roof system including an overlayment, a tile, and a batten. The batten may be disposable between the tile and the overlayment and may include at least one layer of a material defining a multiplicity of passages therethrough, the passages extending generally transversely to a longitudinal axis of the batten and allowing infiltrated liquids to drain therethrough.

There is further provided a method of installing a tile on a roof with a slope. The method may include the step of providing first and second battens, each batten comprising at least one layer of a material defining a multiplicity of air passages therethrough. The defined passages may extend generally transversely to a longitudinal axes of the batten and may allow infiltrated liquids to drain therethrough. The method may further include the step of fixing the first and second battens on the roof such that longitudinal axes of the first and second battens are generally parallel and extend generally horizontally to the roof's slope. The method may further include the step of fixing the tile atop the first and second battens.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a roof of the prior art with a counter-batten system installed thereon;

FIG. 2 is a perspective view of one embodiment of the batten of this invention;

FIG. 3 is an end view of the batten of FIG. 2;

FIG. 4 is a fragmentary, cross-sectional view of a first embodiment of two layers of the batten of FIG. 2;

FIG. 5 is a fragmentary, cross-sectional view of a second embodiment of one layer of the batten of FIG. 2;

FIG. 6 is a fragmentary, cross-sectional view of a third embodiment of four layers of the batten of FIG. 2;

FIG. 7 is a plan view of a sheet of convoluted material suitable for forming the batten of FIG. 2;

FIG. 8 is a side plan view of the sheet of FIG. 7 being foldably assembled into the batten of FIG. 2 after layers have been defined therein;

FIG. 9 is a perspective view of an exemplary roof upon which battens of FIG. 2 has been installed; and

FIG. 10 is a plan view of tiles installed atop the batten of FIG. 2 on the roof of FIG. 9.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIGS. 2 and 3, exemplary batten (spacer) 30 is depicted. Batten 30 generally includes one or more layers 34 and may be characterized by longitudinal axis 36. Layers 34 are described below and generally serve two functions.

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The first function is to allow water to drain therethrough. The second is to enable air exchange. These complimentary functions prevent water pooling and promote drying on roofs on which batten 30 is installed. While one or more layers 34 are contemplated to be within the scope of this invention, if a plurality of layers 34 are present, these layers may be stacked and fixed to each other by such means as stitching 38. However, other fastening means which may be used include hot air welding (or other fastening means using thermal energy), ultrasonic welding, infrared bonding, staples, glue, or other methods known to the art.

One embodiment of two layers of layer 34 is depicted in FIG. 4 generally as layers 50. Each layer 50 includes planar plies 52 and 54 and convoluted ply 56. Convoluted ply 56 is disposed between and bonded to (or otherwise cooperates with) planar plies 52 and 54 to define a multiplicity of air channels 58 therebetween.

Another embodiment of layer 34 is depicted in FIG. 5 generally as layer 60. Layer 60 includes planar plies 52 and 54 and second ply 62. Second ply 62 includes a multiplicity of cross-plies 64. Cross-plies 64 extend generally perpendicular (or otherwise transversely) between planar plies 52 and 54. Thus, planar plies 52 and 54 and second ply 62 cooperate to define a multiplicity of channels 58 therebetween.

Referring to FIG. 6, yet another embodiment of layers 34 is depicted generally as four layers 70. Each layer 70 includes planar ply 52 and convoluted ply 56. Planar and convoluted plies 52 and 56 are bonded to (or otherwise cooperate with) each other to define a multiplicity of channels 58 therebetween. Layers 70 may be stacked such that convoluted plies 56 abut, thereby defining another multiplicity of channels 58 therebetween.

These embodiments of layers 34 include a corrugated plastic (resin) material with a nominal weight appropriate for the structure, and often between a range of about 140 and 160 pounds per thousand square feet. One nominal weight may be about 150 pounds per thousand square feet. The plastic resin may have a 4.0 to 4.5-millimeter profile. The plastic resin may further include an about 4.0 (± 0.2) millimeter profile. The plastic material may still further be black and include ultraviolet (UV) inhibitors to enable the plastic resin to withstand extended exposure to direct UV light. The plastic resin may include a high-density, polyethylene, corrugated, plastic resin with a brittleness temperature of about -103.0 degrees F., a deflection temperature of about +162.0 degrees F. at 66 pounds per square inch, a burn rate of about 2.5 inches per minute, a self-ignition temperature of about 734.0 degrees F., and may also merit a label of "excellence" for smoke density of a 9.3 percent average.

Referring to FIGS. 7 and 8, exemplary sheet 80 may be formed of the materials discussed with respect to FIG. 4 and further described above. Thus, sheet 80 includes a multiplicity of channels 58 defined by a cooperation of members such as planar plies 52 and 54 and convoluted ply 56. Sheet 80 displays first and second surfaces 82 and 84. Exemplary layers 34 may be formed from sheet 80 by the slit-scoring technique or by the nick-scoring technique, each technique being more fully described below. Alternatively, layers 34 may be formed by completely severing sheet 80 generally along lines 86. Separate layers 34 are then stacked and fixed as described above.

The slit-scoring technique is described in U.S. Pat. No. 4,803,813, issued to Fitchman on Feb. 14, 1989, the entire contents of which are hereby incorporated by reference. In the slit-scoring technique, hingelines 88 alternate with hin-

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gelines 90. Hingelines 88 are defined by extending a slit generally along a line 86 and parallel (or generally transversely) to channels 58. The slit extends through planar ply 54 and convoluted ply 56, thereby leaving planar ply 52 intact. Hingelines 90 are defined by extending a slit generally along a line 86 and generally parallel to hingelines 88. The slit extends through planar ply 52 and convoluted ply 56, thereby leaving planar ply 54 intact. Intact planar plies 52 and 54 are thus used as hinges and batten 30 is assembled by Z-folding layers 34 along hingelines 88 and 90 in the manner depicted in FIG. 8.

The nick-scoring technique is an alternative hinge-forming technique described in U.S. Pat. No. 5,094,041, issued to Kasner et al., on Mar. 10, 1992, the entire contents of which are hereby incorporated by reference. In the nick-scoring technique, lines 86 include a series of generally linear perforations. Each perforation substantially extends through planar plies 52 and 54 and convoluted ply 56. Substantially intact portions of planar plies 52 and 54 and convoluted ply 56 remain between perforations. Lines 86 are thus formed into hinges and thereby define layers 34. Layers 34 may be Z-folded along lines 86 in a manner substantially resembling FIG. 8 to assemble batten 30.

Still another hinge-forming technique includes forming completely separated layers 34 and hingably connecting adjacent layers 34 with a pliable adhesive member such as tape.

Channels 58 extend generally perpendicularly, or otherwise transversely, to longitudinal axis 36 of batten 30. As more fully described below, batten 30 is installed in generally horizontal rows on a roof. Channels 58 therefore allow water to drain therethrough, preventing water pooling and enabling air exchange once tiles, or other similar materials, are installed.

As depicted in FIG. 9, roof 100 includes overlayment 102 installed over a decking member as described above. Battens 30 are fixed to roof 100 in generally parallel rows 104. Rows 104 extend substantially horizontally with respect to the slope of roof 100. The distance between rows 104 is determined by the dimensions of the tiles or other materials to be installed. As depicted in FIG. 10, exterior roofing members such as tiles 110, are installed atop battens 30. Thusly installed on a roof, battens 30 function to space tile 110 from the remainder of roof 100 and to drain water which has infiltrated between installed tiles 110, thereby preventing the infiltrated water from pooling atop overlayment 102 and preventing the water from penetrating into the decking and structural members of roof 100. Also as installed on roof 100, channels 58 of battens 30 serve as conduits for air exchange beneath tiles 110, thereby further promoting evaporation of infiltrating water.

Exemplary roof batten 30 may be about $\frac{1}{4}$ inches in thickness, $1\frac{1}{2}$ inches in width, and include two hinged segments 48 inches in length. However, many other dimensions are contemplated to be within the scope of this invention. Exemplary roof batten 30 may be utilized with clay or cement tiles, including flat tiles, S-tiles, and barrel tiles. Moreover, while exemplary roof batten 30 is depicted as being used in conjunction with roof tiles, other exterior roof materials including slate, clay, metal, and cedar may also be installed using exemplary roof batten 30.

Batten 30 of this invention thereby promotes ventilation and prevents water accumulation beneath tiles or similar exterior roofing members. The result of installing the batten of this invention is firstly a roof, which remains drier and is more protected from decomposition and damage than if

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battens of the prior art were used. The roof batten of this invention will not rot, warp, or absorb water as do many of the wooden roof battens of the prior art. Exemplary batten 30 further eliminates excessive nail protrusion through roof coverings, which can also promote water penetration and roof damage. Roof batten 30 of this invention may also enable a substantial decrease in time and expense necessary to install a tile roof as compared to lathe-batten systems of the prior art. Because one embodiment of roof batten 30 includes a pliable, yet resilient resin, tile breakage during installation is reduced when workers step on installed tiles. Other benefits of utilizing batten 30 include elimination of waste and wood splinters during installation. Exemplary battens 30 also weigh less than wooden battens. In contrast to wood battens, battens 30 are easily cut to desired lengths with utility knives.

Because numerous modifications may be made of this invention without departing from the spirit thereof, the scope of the invention is not to be limited to the embodiments illustrated and described. Rather, the scope of the invention is to be determined by appended claims and their equivalence.

What is claimed is:

1. A tile roof system, comprising:
 - an overlayment;
 - a tile; and
 - a batten disposable between the tile and the overlayment, the batten comprising:
 - at least one layer comprising a generally planar first ply and a second ply, the first and second plies cooperating to define a multiplicity of passages extending generally transversely to a longitudinal axis of the batten.
2. The batten of claim 1, in which the second ply includes a multiplicity of cross plies extending between the first plies.
3. The batten of claim 1, in which the second ply is generally convoluted.
4. The batten of claim 3, in which a pair of first plies is present.
5. The batten of claim 4, in which a plurality of layers are present.
6. The batten of claim 5, in which adjacent layers are hingably connected by a hingeline extending generally parallel to a batten longitudinal axis.
7. The batten of claim 6, in which the hingeline is defined by a slice extending through the second ply and one of the first plies.
8. The batten of claim 6, in which first and second hingelines are present, the first hingeline defined by a first slice extending through one of the first plies and the second ply, and the second hingeline defined by a second slice extending through the other of the first plies and the second ply.
9. The batten of claim 6, in which the hingeline is defined by alternate severed and intact portions, the severed portions comprising substantially severed first and second plies, the intact portions comprising substantially intact first and second plies.

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10. The batten of claim 5, in which the layers are stacked and fastened together.

11. The batten of claim 10, further comprising means for fastening the layers together.

12. The batten of claim 10, in which the layers are fastened together by stitching.

13. The batten of claim 10, in which the layers are fastened together by fasteners selected from the group consisting of staples, glue, hot air welding, stitching, ultrasonic welding, infrared bonding, and any combination thereof.

14. A method of installing a tile on a roof with a slope, comprising the steps of:

providing first and second battens, each batten comprising at least one layer of a material comprising first and second plies defining a multiplicity of air passages therethrough, the passages extending generally transversely to a longitudinal axis of the batten;

fixing the first and second battens on the roof such that longitudinal axes of the first and second battens are generally parallel and extend generally horizontally to the roof slope; and

fixing the tile atop the first and second battens.

15. The method of claim 14, in which the layer comprises a first and second generally planar ply and a generally convoluted ply disposed between the first and second plies.

16. The method of claim 15, in which the provided battens comprise a plurality of layers.

17. The method of claim 16, in which the layers further comprise means for fixing said layers in a stacked relationship.

18. The method of claim 17, in which the fixing means includes stitching.

19. The method of claim 17, in which the fixing means is selected from the group consisting of staples, glue, hot air welding, stitching, ultrasonic welding, infrared bonding, and any combination thereof.

20. The method of claim 15, in which the provided battens comprise a plurality of hingably-connected layers.

21. A spacer operatively disposable between a roof decking and an exterior roof material and comprising a plurality of stacked layers, each layer comprising a generally planar first ply and a second ply cooperating with the first ply to define a multiplicity of passages, the passages extending generally transversely to a longitudinal axis of the spacer, the layers fastened together by stitching, adjacent layers connected by a hingeline extending generally parallel to the spacer longitudinal axis.

22. A spacer operatively disposable between a roof decking and an exterior roof material and comprising a plurality of stacked, completely separated layers fastened together by stitching, each layer comprising a generally planar first ply and a second ply cooperating with the first ply to define a multiplicity of passages, the passages extending generally transversely to a longitudinal axis of the spacer.

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